of friction, especially as it is met with in actual practise, is a most complex and elusive factor and in attempting to evaluate its effect or satisfactorily account for its mutations it is not safe to overlook any of the possible influences affecting the final results.

Since 1878 it has been known that Morin's laws regarding friction are absolutely unreliable except within a limited range of conditions. With heavy unit pressures between contact surfaces, such as exist over the small area of contact between driving wheel and rail or between a brake shoe and the wheel to which it is applied with the forces required to stop a modern passenger car under present-day service conditions within a reasonable distance, the coefficient of friction may fluctuate through wide ranges, due to the combined influence of pressure, relative speed of contact surfaces, temperature, continued rubbing and so on. For example, with cast-iron brake shoes on steel-tired wheels the effect of speed has been found to reduce the coefficient of friction from 33 per cent. when just moving, to less than 10 per cent. when at a speed of 60 miles per hour.

This subject is far too broad to warrant further discussion in such a communication as this, but any who may be interested in the experimental results obtained, and the conclusions drawn therefrom, are respectfully referred to papers presented before the British Institute of Mechanical Engineers, June and October, 1878, and April, 1879, by Captain Douglas Galton, describing the classic Westinghouse-Galton experiments on the effect of brakes on railway trains and a paper by Mr. R. A. Parke, in the *Railway Gazette* for June 14–21, 1901, entitled "Friction of Brake Shoes." Copies of the above will be gladly furnished gratis on application to the Westinghouse Air Brake Company, Wilmerding, Pa.

S. W. DUDLEY

QUOTATIONS

ADMISSION TO HARVARD COLLEGE

THE new alternative plan of admission to Harvard College, announced to the schools only a few months ago, was given its initial test at the entrance examinations of last week. The results, so far as one may judge at this early date, were in every way distinctly promising. Over one hundred candidates for admission took advantage of the new provisions, which seems to warrant a belief that the schools already realize the possibilities of the scheme as a method of getting their best pupils into Harvard, and that if this year's results prove satisfactory the number of applications for entrance under the alternative arrangements will show a large increase next year.

Even more significant, moreover, is the fact that of these hundred candidates more than half are from schools outside New England. It was precisely to this constituency—the public high schools outside New England—that the new plan was meant to be of service. It was devised primarily as a means of admitting to Harvard bright boys from distant schools who had pursued good four-year preparatory courses, but who had not been hammered into the particular grooves marked out by the old entrance requirements. The schools of New England, whether public or private, find no very great difficulty in meeting these requirements, and many of them, doubtless, will continue to send their boys along the old route. But the public high schools of the middle states, the west and the south have hitherto found the task of fitting boys for Harvard to be much more difficult, and it was to them that the framers of the new admission plan hoped to afford relief. These schools have responded in the most encouraging fashion at the very outset.

It will not, of course, be possible to draw any definite conclusions concerning the quality of the students admitted under the new requirements until they have passed a year or two in the college, side by side with students who have come to us under the old provisions; but the testimony of those who have been reading the examination books indicates that there is every ground for optimism in this

regard. The schools seem to have met the new arrangements with cordiality and good spirit.—*Harvard Alumni Bulletin.*

SCIENTIFIC BOOKS

Reports to the Local Government Board on Public Health and Medical Subjects (New Series, No. 53). Further Reports (No. 4) on Flies as Carriers of Infection. Pp. 48. Bacon Street, E., London, Darling and Son, Limited. 1911.

This latest number of this very valuable series of reports on flies as carriers of infection includes four articles of cosmopolitan interest: Dr. Copeman, Mr. Howlett and Mr. Merriman report upon an experimental investigation in the range of flight of flies; Mr. Austen presents a memorandum on the result of examinations of flies from Postwick Village and refuse deposit; Dr. Nicoll discusses the part played by flies in the dispersal of the eggs of parasitic worms, and Dr. Graham-Smith gives further observations on the ways in which artificially infected flies carry and distribute pathogenic and other bacteria.

The investigation on the range of flight of flies, by Dr. Copeman, Mr. Howlett and Mr. Merriman, is of great importance and is one which is very difficult to carry to a practical conclusion. Its value in deciding, in practical anti-fly work, the distance from a given point to which it is necessary to carry the abolition of possible breeding places is fundamental. It necessitates the use of a method of marking flies which will not interfere with their normal habits, and can at the best indicate only certainties of observation. It is shown in this report that marked flies in the series of observations were recovered at distances varying from 400 yards to 1,408 yards from the point where they were marked, thus indicating a flight of more than three quarters of a mile. The writer of this notice, in his recently published book "The House Fly —Disease Carrier," brought together all of the previously recorded observations on this point, but was unable to find any substantial records of distances equal to this. While it is true that the probabilities strongly favor a more extended flight, these observations nevertheless record the longest scientifically observed flight and indicate that for at least three quarters of a mile around a given point breeding places must be treated or abolished if the nuisance and danger of the house fly are to be avoided. It should be stated that, in the text on page 8, a distance of 1,700 yards is indicated, but this does not appear in the table. Accepting 1,700 yards, the observed limit of distribution reaches nearly a mile. The authors note that the direction of the prevailing wind is an important factor, and that the time of the distribution observations was forty-eight hours.

Dr. Nicoll, in his consideration of the part played by flies in the dispersal of the eggs of parasitic worms, shows that flies may convey such eggs from excrement to food in two ways, namely, on the external surface of the body and in the intestine. The latter mode occurs only where the eggs are of small size (under 0.05 mm. in diameter). Larger eggs may be carried on the external surface, but these are usually removed by the fly within a short time. Others which are taken into the intestine may remain there for two days or longer, and may remain alive and subsequently cause infection. The eggs of the following parasitic worms have been shown experimentally to be capable of being carried by *Musca domestica: Tænia solium, Tænia serrata, Tænia marginata, Hymenolepis nana, Dipylidium caninum, Dibothriocephalus latus* (?), *Oxyuris vermicularis, Trichuris* (*Trichocephalus*) *trichiurus,* both internally and externally; *Necator americanus, Ankylostoma caninum, Sclerostomum equinum, Ascaris megalocephala, Toxascaris limbata* (=*Ascaris canis* e. p.), *Hymenolepis diminuta* externally only. No Trematode parasites have as yet been experimented with in this investigation.

Dr. Graham-Smith concludes that both house flies and blow-flies are capable of infecting fluids, such as milk and syrup, on which they feed and into which they fall. In the case of the house fly, infected with certain micro-organisms (*B. prodigiosus* and *B. anthracis*), gross infection may be produced in